The Navy Distributed Engineering Plant

Supporting Force Systems Engineering

NSWCDD-T305

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Agenda

- **The Navy's Interoperability Challenge and Solution**
  - Building the DEP
- **Overview of the DEP**
  - Capabilities and Value Added to the Fleet
- **Enabler for Evolving Force Systems Engineering**
  - Forum for Channeling Interoperability T&E Back Into the Systems Development and Acquisition Processes
- **Summary**

1998 - Initial Solutions

- **The Distributed Engineering Plant (DEP)**
  - A High-Fidelity, Shore-Based Battle Group Testbed
  - Formed by Federating Dispersed Combat System Sites Utilizing:
    - ATM Networking Technology (Especially the KG-75 Network Encryptor)
- **The Battle Force Interoperability Test (BFIT)**
  - A Shore-Based Test of an Integrated Battle Group
    - Characterizes the Interoperability of the Battle Group
    - Utilizes the DEP to Emulate the Battle Group Ashore
    - A Critical Milestone for BG Certification

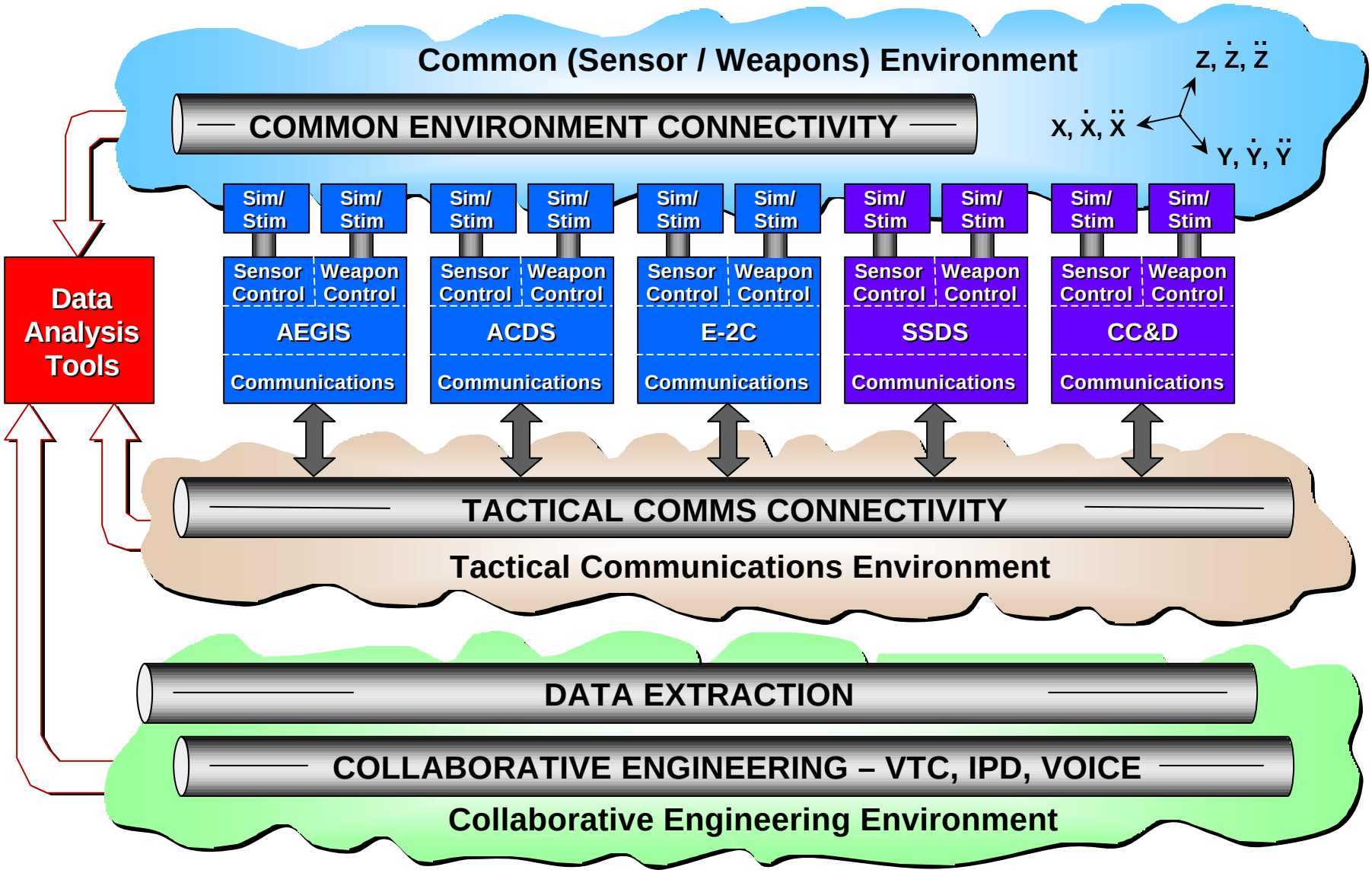
2003 – Evolving Capability

- **Force Problem Resolution**
  - Operational Advisory Group Support
- **Developmental Systems Support**
  - CEC, AEGIS
- **Prototype Development Support**
  - CEC Satellite Range Extension
  - Tactical Component Network (TCN)
  - Multi-TADIL Processor (MTP)
- **Force-Level Performance Evaluation**
  - Battle Force Interoperability Requirements (BFIR) Metrics

NAVSEA
DAHLGREN

Overview of The Navy Distributed Engineering Plant (DEP)

Pulling the Pieces Together: The Landbased Battlegroup



The DEP Network Today

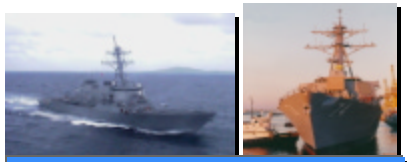
F-14D
NAWCWD
Pt. Mugu

AEGIS CGs/DDGs
ATRC - Dahlgren

DEP Operations Center
NAVSEA - Dahlgren

E-2C GII & HE 2000
NAWCAD - PAX River

Battle Group LINK Monitor
NCTSI - San Diego



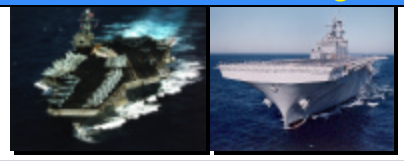
AEGIS CGs/DDGs
SSDS MK 2
ACSC - Wallops Island

E-2C G0 & GII
SSC - San Diego SIF

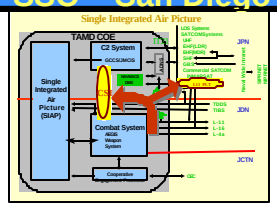
TADIL Operations Center (TOC) & Network Operations Center (NOC)
San Diego, CA

AEGIS CGs/DDGs
ACC - Dahlgren

CV/CVN Class
LHA/LHD Class
SSDS Mk 2
ICSTF - San Diego

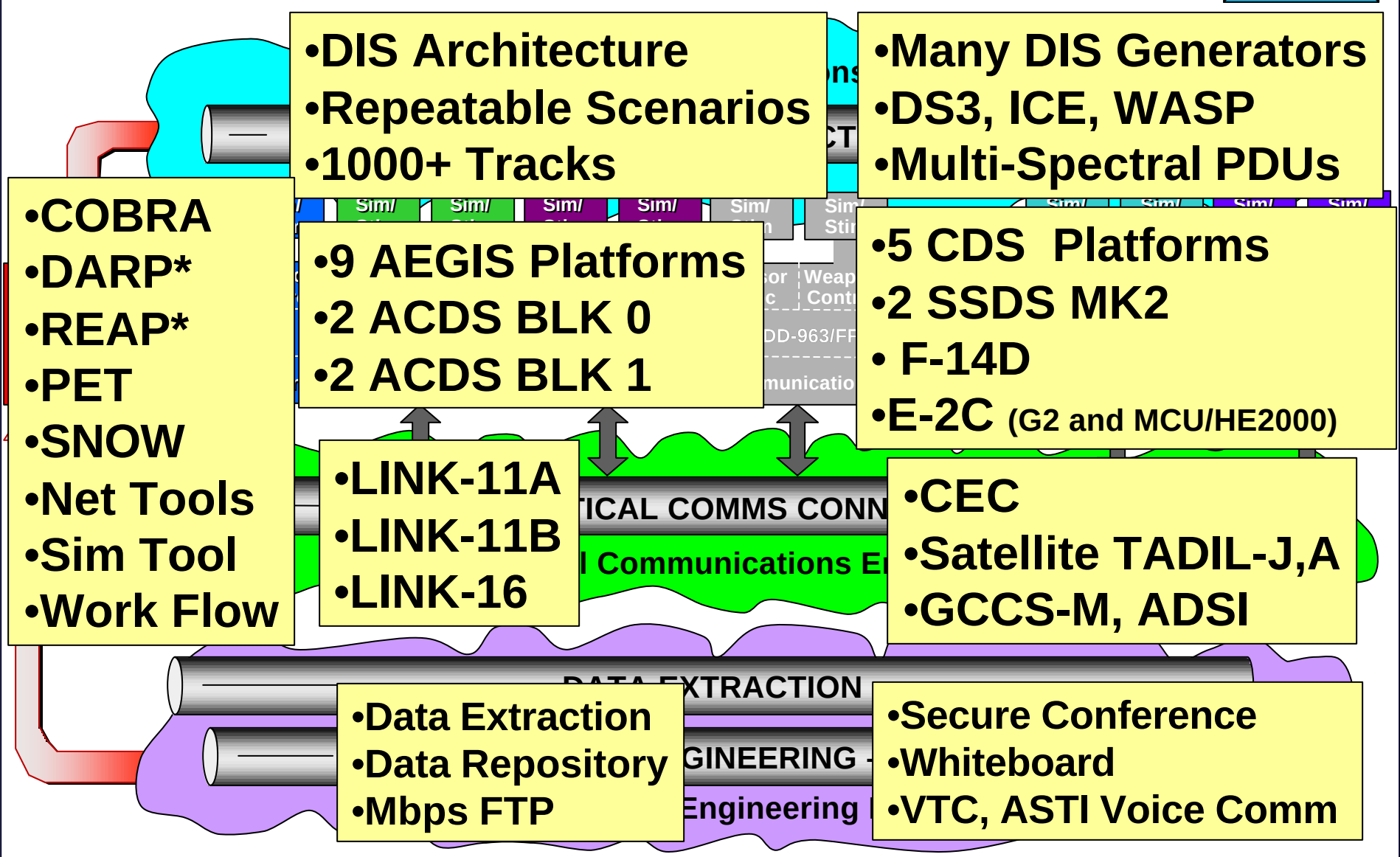


C4ISR
SSC – San Diego



CV/CVN Class
LHA/LHD Class
DD/FFG Class
NAVSEA/ Dam Neck

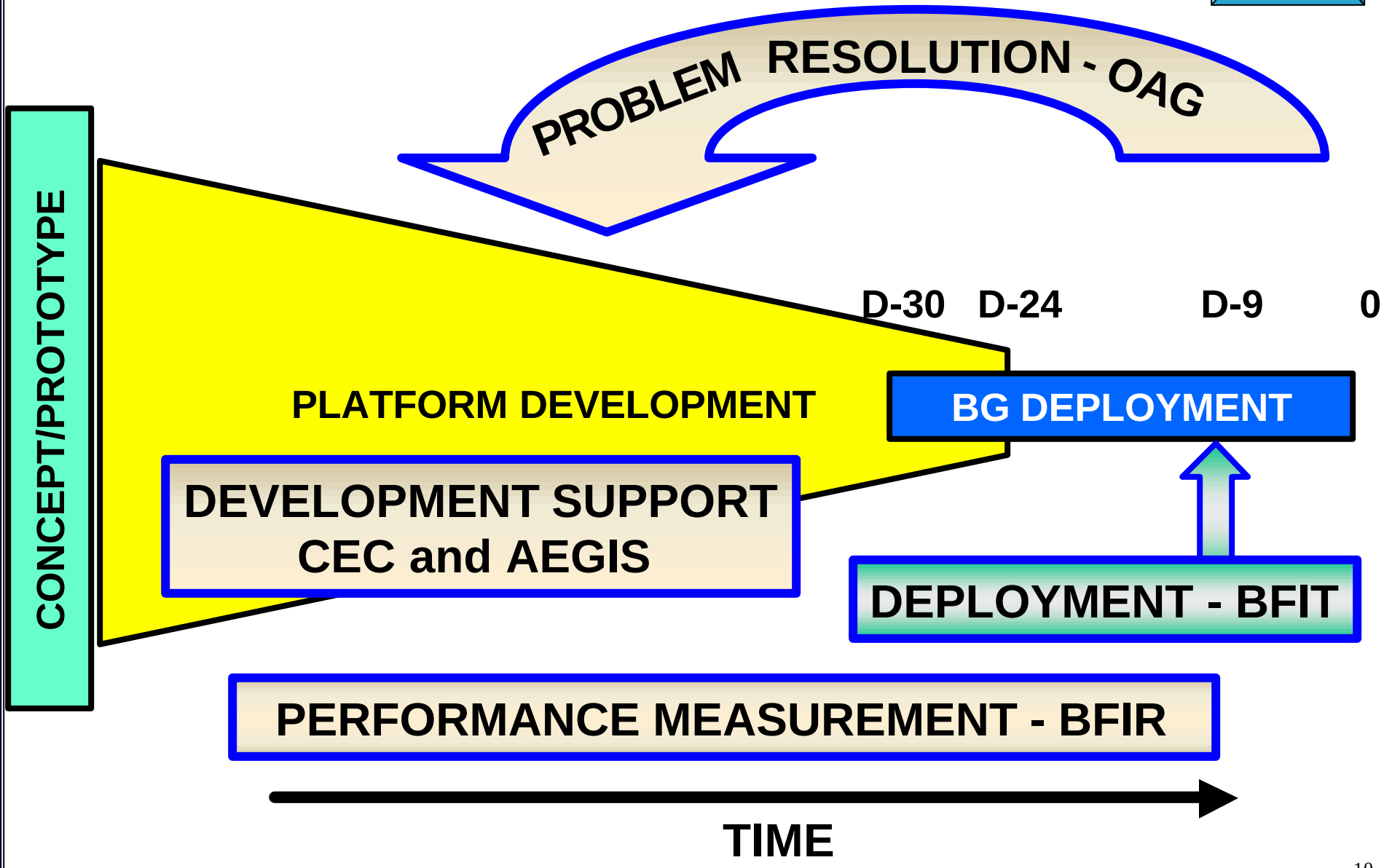
Pulling the Pieces Together:
The Land-Based Battle Group



Core Mission Accomplishments

- **11 BFITs Completed – 17 Battle Groups Tested**
- **Products Delivered**
  - Capabilities – Limitations – Workarounds
  - Trouble Reports Documented
  - Battle Group Performance Baseline and Measurement
  - Tactics, Techniques and Procedures (TTP) Assistance
  - Direct Information Exchange With Each Battle Group Staff
- **<u>Some</u> Battle Group [System] Integration Moved Ashore**
  - Totally Performed Underway by Sailors Prior to DEP
  - Allows the Fleet to Focus on …
    - Other Aspects of System Integration [Non-AAW]
    - Training
    - Workups

Evolving Force Systems Engineering



Interoperability System Engineering Test (ISET)

- **Criteria**
  - High Priority Trouble Reports
  - Frequent Offenders
  - High Probability of Successful Implementation
- **Key to Success:**
  - Partnership With Each Software Support Activity (SSA)
    - Engineers And Programmers at the Consoles
  - Applies Engineer / Tester Approach
- **Accomplishments**
  - Significant Improvements to Upcoming Combat Systems
    - AEGIS (Baseline 5.3.8)
    - ACDS Block 0 (Baseline 10.25)

High Confidence in Successfully Implementing Change – Foundation for Operational Advisory Group (OAG)

BFI OAG Mission – Fix It!

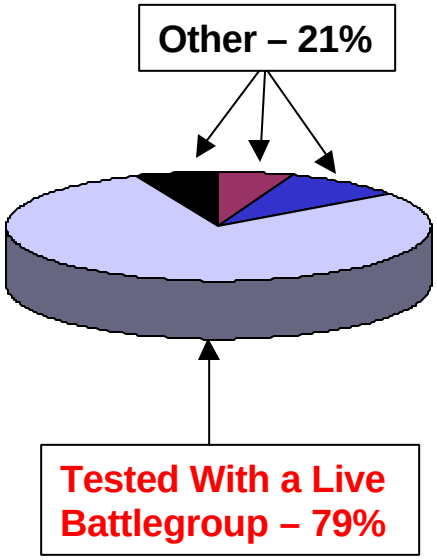
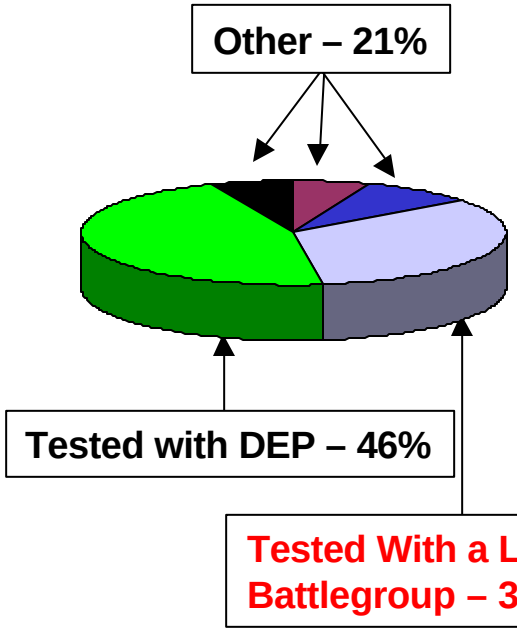
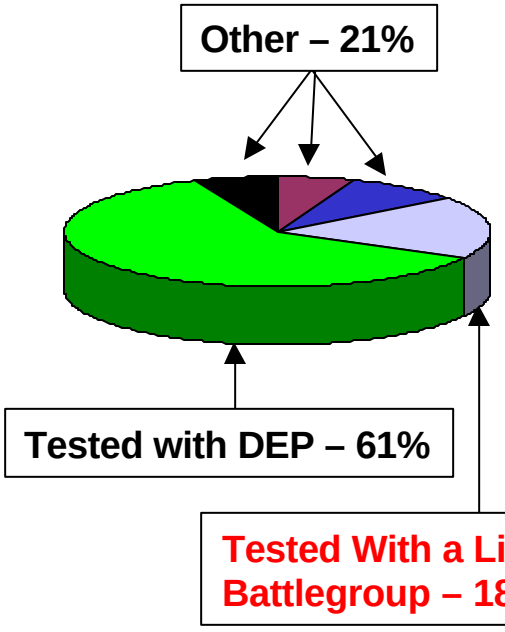
- **Promote the Use of Disciplined Systems Engineering Principles to Set Priorities and Allocate Funding for Incremental Improvements to USN Systems – BF Interoperability Is the Focus**
- **Produce Plans and Implement Corrections to Known Battle Force Interoperability Problems**
  - Support DEPSECDEF C2 Legacy Interoperability Strategy and Milestone Action Plan of 12 October 2001
  - Satisfy RADM Balisle Direction of 21 August 2001
- **Prioritize Top BFI Issues**
- **Impact Near Term Battle Force Deployments**
  - Support ~$4M Budget in FY 02
- **Impact Mid-Term Battle Force Deployments**
  - Support ~$10M Budget in FY 03
  - Support ~$13M Budget in FY 04

Maximize Measurable Improvements of BF Theater Air Missile Defense (TAMD) Interoperability Performance

CEC Development Support

- The CEC IV&V Team Requires Multiple Platforms to Test Many CEC Functions. GOAL: Reduce the Impact to the Fleet – Increase Team Efficiency and Effectiveness.

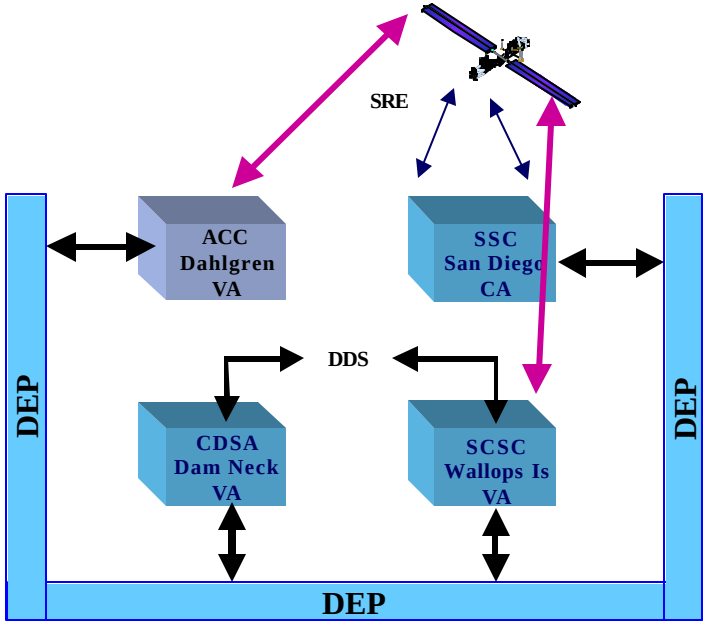
302 CEP Software and System Test Requirements

Pre-DEP	With DEP (Today)	With Future CEC Towers Onshore
		

CEC Satellite Range Extension - Basic Architecture

Joint Dual Network EOR

Preferred Configuration

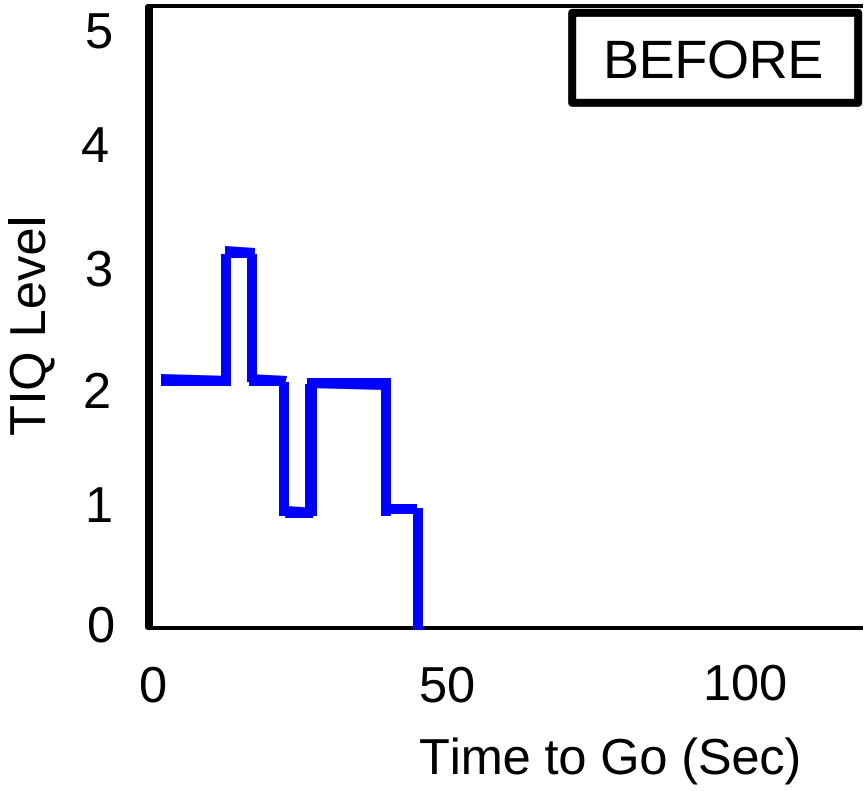


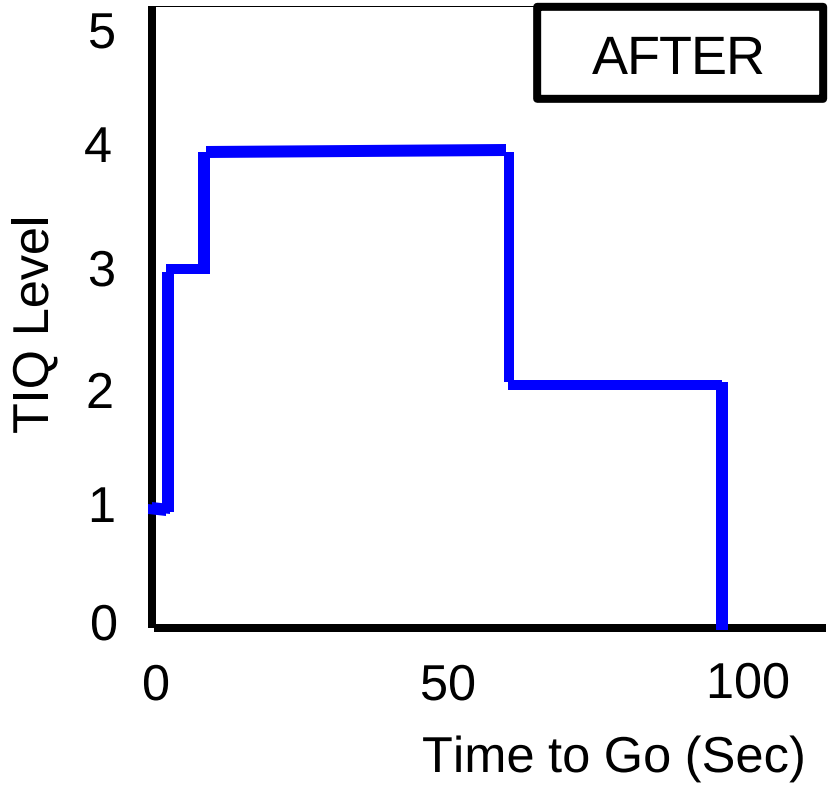
Features

- **Uses DEP for MILSTAR MDR connectivity between sites using SCM VLAN**
- **CDSA DN incorporates DIS Standard PDUs for generated ground truth transmission to ACC, and WI.**
- **ACC receives ground truth from DN and AMR's from WI through two different VLANs via the DEP.**

System Performance Comparisons

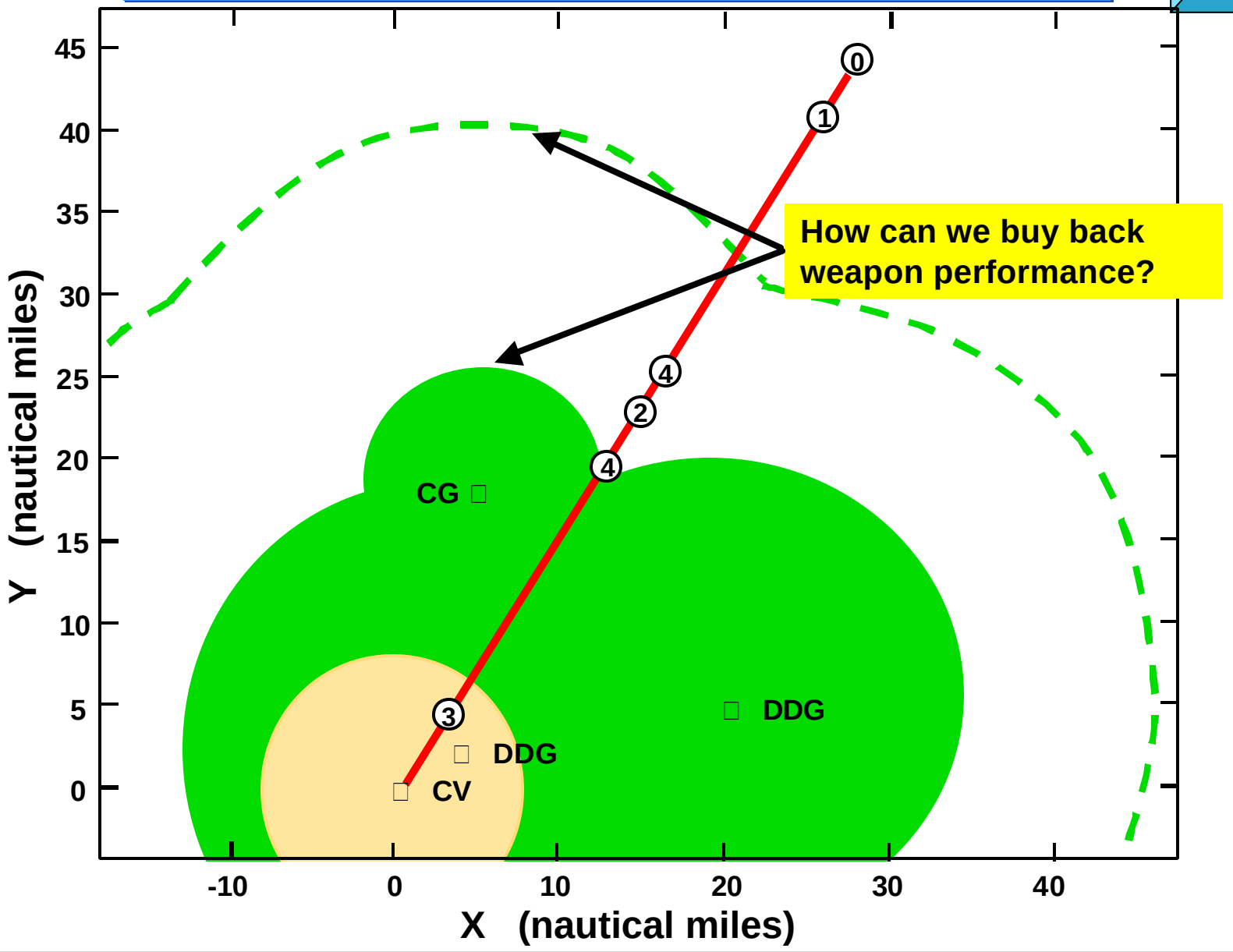
Lincoln/ Truman BFIT	CVN 75	LHA 4	CG 56
	DDG 51	DDG 57	DD 978
	FFG 52	E-2C / GRP II	





Changed the AEGIS DDG-51 and DDG-57 Computer Programs from Baseline 5.3.6 to 5.3.7

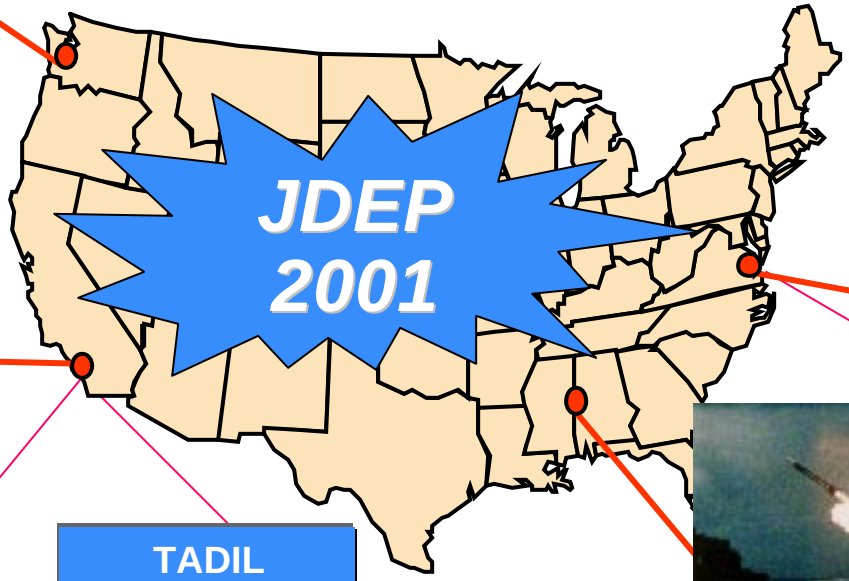
Impact to Force Protection – Taking Back Our Battle Space



JDEP Track 1
Sept 2001 Configuration

- Theater Air and Missile Defense
- Hosted on the Navy DEP
- Proof of Principle for JDEP

AWACS
30/35 w/RSIP
Seattle, WA



AEGIS Ships
B/L 5.3.7
Dahlgren, VA

E-2C G2
San Diego, CA

DEP
Operations
Center (DOC)
Dahlgren, VA

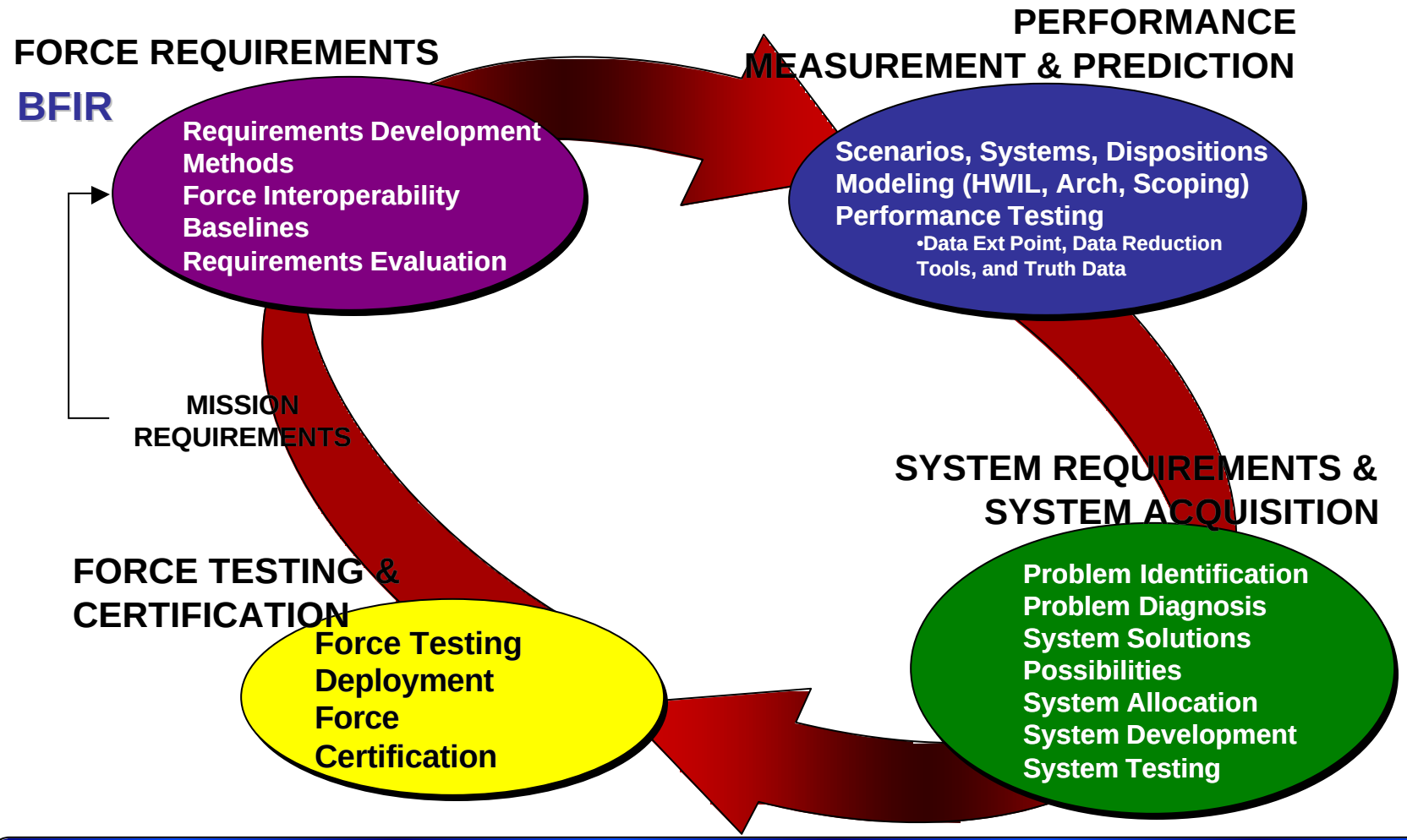
TADIL
Operations
Center (TOC)
San Diego, CA

PATRIOT
PDB 5
Huntsville, AL

Network
Operations
Center (NOC)
San Diego, CA

Event 1 Test Execution Complete 20 SEP 2001

Notional Battle Force Systems Engineering Process



Allocated Performance and Requirements Must be Measurable & Testable Throughout the Process

Summary

- **Navy DEP**
  - Born of Operational Necessity.
    - Real World Combat System Testing and Analysis Leading to Problem Resolution of Today's Fleet Interoperability Problems.
  - Evolving the DEP Mission, beyond BFIT, to support the entire acquisition cycle:
    - Force Problem Resolution
    - Developmental Systems Support
    - Prototype Evaluation
    - Force-Level Performance Evaluation
  - Demonstrated utility for Industry participation
  - Established a solid foundation for the Joint DEP
  - Enabling Navy Acquisition Decisions That Are Based on Sound Battle Group System Engineering Analysis